Post-Endoscopic Retrograde Cholangio-Pancreatography (ERCP) Complications: Our Experience and Comparison with the Literature

Endoskopik Retrograd-Kolanjio-Pankreotografi (ERCP) Komplikasyonlarımız ve Literatürle Karşılaştırılması

Our ERCP Complications

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Özet

Amaç: ERCP, pankreas ve safra yollarının benign ve malign patolojilerinin teşhis ve tedavisinde uygulanabilen minimal invaziv bir yöntemdir. Bu yöntemin başta pankreatit olmak üzere kanama, kolanjit ve duodenal perforasyon gibi ciddi komplikasyonlara yol açabilir. Çalışmada, merkezimizde yapılan ERCP işleminin komplikasyonları literatür ile karşılaştırıldı. Gereç ve Yöntem: Çalışma için ERCP işlemi uygulanmış 176'sı kadın, 163'ü erkek toplam 339 hasta retrospektif olarak araştırıldı. Ortalama takip süresi 2 gün (1- 3) idi. Hastaların ERCP öncesi ve 24-72 saat sonrası hemogram, sedimantasyon, C-reactive protein, alkalen fosfataz, gama glutamil transferaz, total-direkt bilirübin, amilaz ve lipaz değerlerine bakıldı. ERCP işlemi sonrası pankreatit, kanama ve kolanjit oranlarına bakıldı. Bulgular: ERCP yapılan 339 hastanın 26'sında (% 7.6) pankreatit, 15'inde (% 4.4) kanama, 11'inde (% 3,2) kolanjit görüldü. Pankreatit gelişen hastaların yaş ortalaması 56±17 iken pankreatit gelişmeyen hastaların yaş ortalaması 60±14 idi. Bu fark istatistiksel olarak anlamlı değildi (P>0,05). Ancak hastalar kanama ve yaş açısından karşılaştırıldığında, kanama gelişen hastaların yaş ortalaması 67±13 iken kanama gelişmeyen hastaların yaş ortalaması 59±15 idi. Bu fark istatistiksel olarak anlamlı bulundu (P<0,05). Tartışma: Komplikasyon oranlarımızın literatüre göre yüksek bulunmasının nedeni merkezin yeni kurulmuş olması ve referans merkez olmasına bağlandı. Çalışmada en dikkat çekici sonuç hasta yaşı arttıkça ERCP sonrası kanamanın da artmış olmasıydı. Sonuç olarak yaşlı hastalarda ERCP komplikasyonlarını azaltmanın etkin yollarından biri gereksiz ERCP den kaçınmaktır.

Anahtar Kelimeler

ERCP Komplikasyon; Pankreatit; Kanama; Duodenal Perforasyon

Abstract

Aim: Endoscopic retrograde cholangio-pancreatography (ERCP) is a minimally invasive method used in the diagnosis and treatment of pancreatobiliary disorders. Endoscopic retrograde cholangio-pancreatography (ERCP) may lead to serious complications including pancreatitis, bleeding, cholangitis, and perforation. In this study, we compare our experience with post-ERCP complications with the literature. Material and Method: A total of 339 patients who underwent ERCP, including 176 (51.9%) female and 163 (48.1%) male patients, were retrospectively evaluated. Hemogram, sedimentation, C-reactive protein, alkaline phosphatase, gama-glutamil-tranferase, total direct bilirubin, and amylase and lipase activities were recorded both before and 24-72 h after ERCP. The rates of post-ERCP complications of pancreatitis, bleeding, and cholangitis rates were evaluated. Results: A total of 339 patients who underwent ERCP, including 176 (51.9%) female and 163 (48.1%) male patients, were retrospectively evaluated. Of the 339 patients, pancreatitis occurred in 26 (7.6%), bleeding in 15 (4.4%), and cholangitis in 11 (3.2%). The patients with pancreatitis had a mean age of 56±17 years and the patients without pancreatitis had a mean age of 60±14 years; however, no significant difference was found (p>0.05). The patients with bleeding had a mean age of 67±13 years and the patients without bleeding had a mean age of 59±15 years; a significant difference was found. Discussion: The study shows that the incidence of post-ERCP bleeding increases with age. The most effective way of reducing ERCP complications in elderly patients is to avoid unnecessary ERCP.

Keywords

ERCP Complication; Pancreatitis; Bleeding; Perforation

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Introduction

Endoscopic retrograde cholangio-pancreatography (ERCP) is a minimally invasive method used in the diagnosis and treatment of benign and malignant pancreatobiliary disorders. In particular, ERCP became a commonplace method for the diagnosis and treatment of benign and malignant pancreatobiliary disorders following the visualization of the bile duct and pancreatic duct by McCune et al. in 1968 and following the introduction of endoscopic sphincterotomy by Koch et al. in 1973 [1,2].

Risk factors for post-ERCP complications include the characteristics of the patient, the experience of the endoscopist, the methods employed, and the number of procedures undertaken. Elmuzer and Bor et al. shows that the rates of post-ERCP complications are higher in interventional procedures compared to diagnostic procedures [3,4].

In this study, we present the complications detected in the patients who underwent ERCP due to pancreatobiliary disorders at Akdeniz University Medical School Department of Gastroenterology between January 2009 and February 2012.

Material and Method

The retrospective study included a total of 339 patients who underwent ERCP at Akdeniz University Medical School Department of Gastroenterology between 2009 and 2012. The patients included 176 female and 163 male patients with a mean age of 47 (18-79). For the follow-up of the complications, hemogram, sedimentation, C-reactive protein (C-rp), alkaline phosphatase(Alp), gama-glutamil-tranferase (Ggt), total/direct bilirubin, and amylase and lipase activities were recorded both before and 24-72 h after ERCP. The diagnoses made by ERCP and the number of ERCP procedures performed for each patient were also recorded (Tables 1, 2).

ERCP was performed using a Fujinon ED-450XT5 duodenoscope (Tokyo, Japan) under the guidance of fluoroscopy. Propofol was intravenously administered for sedation. Prior to ERCP, 1 gr intravenous ceftriaxone was administered for prophylaxis and intravenous Hyoscine N-methyl bromide was administered to reduce intestinal contractions.

Laboratory tests and serum amylase and lipase activities were spectrophotometrically evaluated using an automated analyzer (Olympus AU 2700, Mishima Olympus Co. Ltd, Japan). The complications were defined based on the Cotton's classification [5].

Table 1. The diagnosis of the patients with ERCP

Diagnosis	N	%
Choledocolitiasis	113	33.3
Cholangiocellular Carcinoma	31	9.1
Oddi Sphincter Fibrosis	16	4.7
Liver Transplantation Anastomotic Stricture	15	4.4
Pancreatic Cancer	12	3.5
Choledochal Mass Compression	11	3.2
Benign Choledochal Stricture	11	3.2
Failed ERCP	9	2.72
Normal ERCP	78	23
Others	43	12.78
TOTAL	339	100

Table 2. The number of ERCP procedure

Number of procedures	Number of patients	%
1	222	65.1
2	73	21.5
3	20	5.89
4	12	3.53
5	7	2.06
6	2	0.58
7	1	0.29
8	2	0.59
Total	339	100

Multivariate analysis and Mann-Whitney U test were used for the statistical evaluations and a p value of <0.05 was considered significant.

Results

Post-ERCP complications occurred in 52 (15.3%) of the patients, including 26 (7.6%) patients with pancreatitis, 15 (4.4 %) with bleeding, and 11 (3.2%) with cholangitis. Pancreatitis was found to be mild in 12, moderate in 13, and severe in 1 patient. Cholangitis was found to be mild in 5, moderate in 5, and severe in 1 patient. Total mortality occurred in 2 (0.58%) patients (Table 3).

The correlation between gender and pancreatitis, cholangitis, and bleeding was investigated but no significant difference was found.

In the 26 patients with pancreatitis, ERCP was performed once in 20, twice in 5, and five times in 1 patient. No correlation was found between the number of ERCP procedures undertaken and pancreatitis development (Table 3).

Table 3. ERCP diagnoses of the patients with Pancreatitis, Cholangitis and Bleeding

Diagnosis	Complications				Total
	None	Pancreatitis	Cholangitis	Bleeding	
Choledocolitiasis	90	10	2	4	106
Cholangiocellular Carcinoma	22	1	1	3	27
Oddi Sphincter Fibrosis	13	1	1	1	16
Liver Transplantation Anastomotic Stricture	13	0	1	1	15
Pancreatic Sancer	9	0	0	1	10
Choledochal Mass Compression	7	2	1	1	11
Benign Choledochal Stricture	19	1	1	0	21
Failed ERCP	5	3	1	0	9
Normal ERCP	68	5	2	3	78
Others	41	3	1	1	46
TOTAL	287	26	11	15	339

In the 15 patients with bleeding, ERCP was performed once in 7, twice in 3, three times in 3, and four times in 2 patients. No significant difference was found between the patients who underwent ERCP once and the patients who underwent multiple

ERCP procedures (Table 3).

The patients with and without bleeding were compared in terms of mean age. The mean age was 67±12 years in the patients with bleeding as compared to 59±15 years in the patients without bleeding, suggesting that the patients with bleeding had a higher mean age compared to the patients without bleeding (Table 3) ($p<0.05$).

The 26 patients with pancreatitis had a mean age of 56±17 years and the patients without pancreatitis had a mean age of 60±14 years; however, no significant difference was found. Pancreatitis occurred in 23 (8.4%) out of the 274 patients who underwent sphincterotomy and in 3 (7.5%) out of 40 patients who did not undergo sphincterotomy; however, no significant difference was found ($p<0.05$). Bleeding occurred in 14 (5.1%) out of 274 patients who underwent sphincterotomy and in 3 (7.5%) out of 40 patients who did not undergo sphincterotomy; however, no significant difference was found ($p<0.05$).

Between the patients who did and did not undergo liver transplantation, no significant difference was found in terms of post-ERCP complications including pancreatitis and bleeding. The comparison revealed that liver transplantation did not increase complication rates (Tables 4, 5).

Table 4. Association between liver transplantation and post-ERCP pancreatitis

	With Pancreatitis	Without Pancreatitis	Total
Liver Transplantation Performed	1	14	15
No Liver Transplantation Performed	25	299	324
Total	26	313	339

Table 5. Association between liver transplantation and post-ERCP bleeding

	With Bleeding	Without Bleeding	Total
Liver Transplantation Performed	1	14	15
Liver Transplantation not Performed	12	312	324
Total	13	326	339

The association between stent insertion and pancreatitis and bleeding development was investigated but no significant correlation was found.

Magnetic resonance cholangio-pancreatography (MRCP) was performed in 52 out of 339 patients. The comparison of MRCP and ERCP diagnoses reveal that the diagnoses were the same in 35 (67.3%) patients and different from each other in 17 (32.7%) patients. Of the patients with different diagnoses, 10 had a normal ERCP, 7 had choledocholithiasis on MRCP, 1 patient had choledochal dilatation, 1 patient had pancreatic duct disruption, and 1 patient had a space-occupying lesion in the choledochus.

Discussion

In the literature, post-ERCP complications and their rates have been reported as follows: pancreatitis 1.6-15.7%; bleeding 1.2-4.5%; cholangitis 1-5.6%; and perforation 0.1-0.3%. The mortality rate has been reported to be 0.06% [6-11]. The rates in our study are as follows: pancreatitis 7.6%; bleeding 4.4 %; and cholangitis 3.2%. These results indicate that the rates for bleeding and cholangitis in our study were higher than the rates reported in the literature. We believe this can be attributed to the fact that our hospital is a new reference hospital where patients who have had prior failed surgeries are admitted.

In multivariate studies, biliary sphincter balloon dilatation, pancreatic sphincterotomy, and access (precut) sphincterotomy have been shown to be risk factors for post-ERCP pancreatitis [12-14]. In our study, the patients who did and did not undergo sphincterotomy were compared in terms of pancreatitis development; no significant difference was found. This finding may be attributed to the small number of patients in our study as compared to the studies reported in the literature.

In several studies, female gender has been shown to be an independent risk factor for post-ERCP pancreatitis [15], but a number of other studies have reported that gender is not a risk factor for post-ERCP pancreatitis [12,13]. In our study, we also found no difference between male and female patients in terms of pancreatitis development.

Young age has been commonly shown to be a risk factor for post-ERCP pancreatitis [13]. In our study, although the mean age of the patients with pancreatitis was lower than the mean age of the patients without pancreatitis, no significant difference was found between the two patient groups.

Performing multiple ERCP procedures has been reported in some studies to be a risk factor for post-ERCP pancreatitis [16], whereas some other studies have suggested that the development of post-ERCP complications is dependent on the experience of the endoscopist rather than the number of procedures undertaken [15]. In our study, it was revealed that performing multiple ERCP procedures led to a significant increase in the rates of post-ERCP pancreatitis and other complications. However, it was found that performing multiple ERCP procedures for a single patient is not an independent risk factor for post-ERCP complications.

Bile duct intervention has been shown in several studies not to be a risk factor for an increase in the incidence of post-ERCP pancreatitis, but in other studies it has been shown to be a risk factor [11,13,14]. The studies reporting the bile duct intervention as a risk factor for post-ERCP pancreatitis have identified this risk in multivariate analyses and, unlike other studies, have reported that bile duct stent insertion is an independent risk factor [11,15,16]. In our study, there was no significant difference between the patients who did and did not undergo bile duct stent insertion in terms of post-ERCP pancreatitis. In the studies mentioned above, a metallic stent had been inserted in the patients with malignant biliary obstruction. In our study, since no classification was performed based on the features of the stents and the severity of the malignancies of the patients, we consider that our findings are likely to be different from those reported in the literature.

Post-liver transplantation biliary complications (biliary stricture, choledocolitiasis, biloma, hemobilia, Oddi sphincter dysfunction, and bile duct leak) have been reported to occur in 5-25% of the patients. ERCP is a minimally invasive method used in the patients presenting with these complications, particularly the patients undergoing choledoco-choledochostomy [5, 9]. In our study, the complication rates in the patients who did and did not undergo liver transplantation were similar to each other.

Post-ERCP bleeding has been reported to have an incidence

of 1.2% [4,11,16]. In our study, the rate of post-ERCP bleeding (4.4%) was slightly higher than the rate reported in the literature. In numerous multivariate analyses, sphincterotomy, cholangitis, papillary stenosis, access (precut) sphincterotomy, and low endoscopic volume by the endoscopist (which is defined as 1 sphincterotomy per week or less) have been reported as the risk factors for post-ERCP bleeding [13,16].

In the studies reporting the risk factors for post-ERCP bleeding, age is shown to not be a risk factor [11, 13, 14]. In our study, the patients with bleeding had a mean age of 67.29±13.45 years and the patients without bleeding had a mean age of 59.3±15.13 years; a significant difference was found between the two groups ($p<0.05$). Nevertheless, further large-scale studies are needed to substantiate this finding.

The number of ERCP procedures undertaken per patient has not been reported as a risk factor for post-ERCP bleeding. Similarly, we found no correlation between the number of ERCP procedures and post-ERCP bleeding.

Studies have shown that the incidence of post-ERCP bleeding in patients undergoing liver transplantation is similar to that of the general population [9]. We also found no significant difference between the patients who underwent liver transplantation and the general population in terms of post-ERCP bleeding.

Literature shows that the avoidance of unnecessary ERCP in the cases where MRCP is sufficient is of prime importance for the prevention of pancreatitis [4]. In our study, we compared the MRCP and ERCP outcomes of the 52 patients and found that the ERCP and MRCP diagnoses were the same in 32 patients and different from each other in 20 patients. Of the patients with different diagnoses, 10 had a normal ERCP, whereas 7 patients had choledocholithiasis on MRCP, 1 had choledochal dilatation, 1 had pancreatic duct disruption, and 1 had a space-occupying lesion in the choledochus.

Our study was limited because patient diagnoses were not exhaustively analyzed. In particular, in patients where ERCP and RCP resulted in different diagnoses, the diagnostic value of ERCP was not compared to that of MRCP.

Conclusion

Age was found to be a risk factor for post-ERCP bleeding. The rate of complications in our patients was higher than rates reported in the literature; this can be attributed to the fact that our hospital is a relatively new center, a prominent reference center in the region, and an important center for kidney and liver transplantation. In conclusion, the most effective way of reducing post-ERCP complications in elderly patients is to avoid unnecessary ERCP and to make accurate diagnoses.

Declaration of conflict of interest: The authors declare that there is no conflict of interest.

Competing interests

The authors declare that they have no competing interests.

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